
ENERGY QUEST 2014

OVERVIEW

The first International Conference on Energy Production and Management in the 21st Century – The Quest for Sustainable Energy, took place in Ekaterinburg, Russia, organised by the Ural Federal University (UrFU) and the Wessex Institute, UK. The Conference Chairmen were Professor Carlos A Brebbia, from the Wessex Institute, and Professors Elena Magaril and Mikhail Khodorovsky, both from the Ural Federal University. The meeting, called Energy Quest for short, aimed to review and discuss the fields of energy production and management in a changing world.

Modern society requires an ever increasing amount of energy resources, which creates complex technological, economic and political challenges. The conference compared conventional energy sources, particularly hydrocarbons, hydroelectric and nuclear, with a number of other ways of producing energy, emphasising technological developments. The challenge is, in many cases, the conversion of new sources of energy into useful forms and finding efficient ways of storing and distributing energy.

Energy policies and management are of primary importance and need to be consistent with advances made in production and distribution. Furthermore, recent advances in the exploitation of depleted fields, shale oil and gas deposits, have changed the whole picture and given rise to new opportunities.

In the medium term a wide variety of energy alternatives are available, varying from nuclear to conventional hydrocarbons to those relying on renewable resources. There is a primary requirement to investigate the different types of energy and optimise their production, distribution and usage. In the long term there is a need to invest in new ways of harnessing solar power into energy that can be produced efficiently, is easy to store and can be distributed without major difficulties.



Professor Carlos A. Brebbia

OPENING OF THE CONFERENCE

The conference was opened by the Rector of UrFU, Professor Viktor Koksharov, who expressed his appreciation to the different parties who contributed to organise the meeting, including the local authorities, the SINARA group and WIT. He explained the importance of these meetings to develop the full research capabilities of the Ural Federal University and open opportunities for future collaboration.

Mr Neil Semple, British Council in Ekaterinburg, referred to the importance that his government attached to the development of sustainable energies and the help that is available through the Prosperity Fund, which allows top organisations like the Ural Federal University to collaborate with British institutions. He complimented the organisers, including the Wessex Institute, for having arranged such a successful meeting.



Professor Elena Magaril

Igor Chekzizov, Vice Minister for Development of the Sverdlovsk region, talked of the importance of the Ural Federal University, one of the best in Russia. The conference was supported by the Ministry at an early date following a meeting held with the presence of Professors Magaril and Brebbia, to both of whom he expressed his congratulations. The Ministry supports these developments and sees them as sources of expert knowledge for the development of the region.

The Co-chairman of the conference, Professor Mikhail Khodorovsky, from the Ural Federal University and Head of SINARA industrial group, explained the importance of the topics described during the meeting to the development of the industrial capability of the region.

Professor Elena Magaril, head of the department of Environmental Economics of UrFU welcomed the developments and the excellent collaboration with WIT that led to the organisation of the meeting.

Professor Carlos A Brebbia, Director of Wessex Institute, then referred to the importance of conferences like this in relation to the objectives of the Institute, i.e. the dissemination of knowledge at an international level. WIT although academically affiliated to the University of Wales, is otherwise an independent institution. Carlos described the work carried out by WIT Press, the academic publishers of the Institute, who have produced the Energy Quest conference book. WIT Press have launched a series of Journals, and are due to start a new one shortly as a result of this conference, i.e. the International Journal of Energy Production and Management. Finally, Carlos referred to the well established medal launched in 1994 by the University of Siena and the Wessex Institute, in honour of the late Professor Ilya Prigogine, Nobel Prize for Chemistry and Honorary Chairman of one of the Institute's conferences as well as Honorary Editor of a WIT Press International Journal. Professor Prigogine was Russian by birth, as is the latest medallist, Professor Vladimir Voeikov from Moscow University who received the award last year at the Bucharest University of Technology.

KEYNOTE AND INVITED PRESENTATIONS

The first technical presentation of the meeting was by the Minister, Nicolai Smirnov and entitled “The Sverdlovsk Region: Steps towards sustainable development and energy security”. The government is anxious to communicate with all stakeholders and receive as much scientific advice as possible. Energy is plentiful in the region and this ought to lead to Sverdlovsk having a competitive advantage over other parts of Russia. To improve on this the government is focussing on optimising the use of energy and reviewing the infrastructure, aiming to reduce consumption.

Dr Erik Jarlsby, Senior Consultant from Avito company in Norway, gave a keynote address on “The global energy challenge: Still fuel for progress?”, which referred to the global mission of the energy sector, i.e. (i) provide energy to enable human development; (ii) avoid serious damage to the environment, and (iii) convert those resources to lasting benefits for the nations.

During his presentation, Professor Nader Mahinpey from the University of Calgary, described “Pathways to energy and environmental sustainability: A Canadian perspective”. Nader is internationally known in the field of energy and the environment. Canada has the third largest reserves of oil in the world, but 97% is non conventional, i.e. mainly oil sands. In terms of gas it is the third largest producer, after Russia and USA, mostly of shale gas. It has also large coal reserves. Furthermore, a large proportion of its own energy is hydroelectric. The aim is to reduce the use of coal and increase that of renewables.

The keynote address by Professor Ove T. Gudmestad from the University of Stavanger in Norway concentrated on “Sustainable oil and gas production in the 21st century with emphasis



Delegates during the Conference

on offshore fields”. He pointed out the importance to ensure that oil and gas production is carried out in a sustainable way. His field of interest led to WIT Press publishing a book he wrote on Petroleum Energy, available in Russian as well as English. Ove stressed the importance of avoiding pollution in oil and gas production fields.

The keynote address by Professor Fabio Polonara of the Università Politecnica delle Marche, Italy, dealt with the “Demand side management of the built environment for sustainable energy”. He presented the case of several buildings from different periods to compare the importance of the new EU directives.

Professor Godwell Nhamo from the University of South Africa dealt with a controversial topic under the title “Green economy: A game changer ushering the death of the internal combustion engine?” Green growth rests upon the need to convert economies from being resource intensive to being low carbon and resource efficient. He considers that electric vehicles are inevitable and that green growth signals the death of the internal combustion engine in the not too distant future.

The problem of energy rating for green buildings in Europe was presented by Montserrat Zamorano of the University of Granada. Her paper summarises and analyses the most important differences between energy rating systems defined in the European Union communities according to the current legislative framework. The paper shows substantial differences between them in spite of having been developed to achieve the same objectives.

Solar energy systems was the topic of the presentation by Hussain Al-Kayiem from Petronas University in Malaysia. He discussed some setbacks suffered by solar energy and how they can be reversed by integrating it with other energy sources.

Another source of energy was discussed by Professor Elena Rada from the University of Trento in Italy, who spoke about how to obtain energy from municipal solid waste. This energy can be obtained by combustion, gasification or pyrolysis.

Professor Giuseppe Genon from the Politecnico di Torino, spoke about “Energy from biomass: The potentialities, environmental aspects and technology”. He also described the effects on climate change and the local acceptability as well as the competitive aspects and general costs involved.

FURTHER INVITED PRESENTATIONS

Other invited presentations were:

“Russian power sector reform: Lessons for developing countries” **Leonid D. Gitelman**, Ural Federal University, Russia.

“The impact of fiscal policies and standards on passenger car CO₂ emissions in EU countries” **Amela Ajanovic**, Vienna University of Technology, Austria.

“Economical mechanism for the reform of regional heat supply systems” **Yulia Munts**, Ural Federal University, Russia.

“Planning for sustainable development of energy infrastructure: FAST – Fast Simulation Tool” **Robert Barelkowski**, Polish Academy of Science, Poland.

“Single-phase media hydrodynamics and heat transfer in heat exchangers with twisted profile tubes” **Yuri M. Brodov**, Ural Federal University, Russia.

“Structural design in a power grid company” **Andrey Makarov**, Bashkirian Power Grid Company, Russia.

“Ion transport membrane technology for the primary processing of natural gas” **Victor Kozhevnikov**, Institute of Solid State Chemistry, Russia.

“The solution to strategic problems in the oil refining industry as a factor for the sustainable development of automobile transport” **Elena Magaril**, Ural Federal University, Russia.

“The influence of rectification sharpness on the quality of motor fuels” **Maxim Rogalev**, Tyumen State of Oil & Gas University, Russia.

“Renewable energy-based plant remote monitoring complex using Wi-Fi channels and elements of artificial vision” **Sergey E. Shcheklein**, Ural Federal University, Russia.

“Estimation of the tribotechnical parameters of the ‘piston skirt–cylinder liner’ contact interface from an IC-engine for decreasing the mechanical losses” **Vladislav Lazarev**, South Ural State University, Russia.

“Exhaust emissions from modes of transport under actual traffic conditions” **Jerzy Merkisz**, Poznan University of Technology, Poland.

“Long-term developments in residues from the processing of alum shale and possible remedies” **Rolf Sjöblom**, Luleå University of Technology, Sweden.



Delegates during lunch

CONFERENCE TOPICS

The substantial number of presentations were classified under the following topics:

- Energy policies
- Energy management
- Energy and economic growth
- Energy economics
- Energy security
- Energy production
- Energy transmission and distribution
- Energy conversion
- Energy efficiency
- Energy networks
- Energy and transport
- Energy in the built environment
- Hydrocarbons
- Processing of oil and gas
- Pipelines
- Nuclear energy
- New energy sources
- Biomass and biofuels
- Environmental risks
- Emissions
- Training in energy and sustainability
- Computational and experimental studies



Round table discussion

SPECIAL DISCUSSION

At the end of the first day a special round table discussion was organised to set up a group consisting of researchers from some of the different countries represented at the meeting. The aim was to set up a programme to train future managers for the Energy industry.

The group would bring together the best capabilities and resources of the members to put forward innovative world class management training. The initiative would be coordinated by the Graduate School of Economics and Management of UrFU, with the collaboration of the Wessex Institute.

Such a programme needs to be interdisciplinary and involve engineering as well as economics, taking into account environmental assets and investment. The ENGEC Centre at UrFU has experience in Engineering Management Systems, Banking, Investment and Environmental Economics, as well as having many well established links with universities and industries.

Graduates from the programme ought to be able to handle complex problems, working in interdisciplinary teams and with a “hands on” approach. It is important to train them in the context of global trades and being able to generate new knowledge.

The programme is designed for next generation Managers to build an elite group of professionals capable of working in any engineering company implementing energy policies for the 21st century.

The idea gave rise to a most interesting and lively debate during which a series of improvements were proposed, including the need to develop a common language to bridge the differences between different disciplines and the requirement to find a budget to support the initiative. There was general agreement that a programme of education on Global Energy Systems, would be most welcome.

The meeting concluded by reminding each member to find out the attitude of their institution towards such a programme.

TOUR AND CONFERENCE DINNER

At the end of the second day the delegates were taken on a guided bus tour of Ekaterinburg, visiting some of the most famous places, such as the Church of the Blood, now standing on the site of the basement where the Tsar and his family were murdered by the local Bolshevik regime and the monument to those soldiers who died in Afghanistan and later on in Chechnya. This resembles a tulip in black marble, as a reminder of the name given to the plane – black tulip – bringing their coffins home. Ekaterinburg is also known for arts and music and has a well known Opera House, which is also the home of its excellent ballet company.

After the tour the delegates proceeded to the banquet, which took place in a restaurant serving Russian and Ukrainian specialities. The convivial atmosphere and friendship amongst delegates made this a unique occasion. Numerous vodka and wine toasts were made by the participants who were able to appreciate the classical Russian hospitality.



Conference dinner

YOUNG RESEARCHER SEMINAR

The Conference was an occasion to programme several activities including a Young Researcher Seminar that took place at the headquarters of the SINARA Group in downtown Ekaterinburg. Professor Carlos Brebbia opened the seminar by explaining to the young Master and PhD candidates present the importance of being open to new ideas in order to be able to make significant contributions to technology and wealth creation, as well as for further academic development. New ideas, Carlos said, frequently originated from the cross-fertilization between different disciplines; methodologies employed in one field can be transferred to others for the solution of a whole range of new problems. This Seminar – Carlos explained – consists of short presentations by well known scientists who can demonstrate to young researchers some of the latest international trends.

The presentations covered the following topics:

- Evolution of green energy and bio-refinery in North America
- Sustainability in energy production
- The global energy challenge: Still fuel for progress?
- Demand side management in the built environment for sustainable energy
- Technology for Arctic offshore oil and gas developments
- Energy rating for green buildings in Europe
- MSW bio-drying and energy recovery
- Energy paradox under BRICS' green growth transition: No coal, no security?
- Local planning for renewable energies: Environmentally sensitive approach
- Sewage sludge treatment and energy recovery
- Solar integrated systems

CLOSING OF THE CONFERENCE

Professors Carlos Brebbia and Elena Magaril closed the conference by thanking the participants for their contributions and excellent papers. The success of the meeting was due to the close collaboration between those at WIT and Elena's team at UrFU. Carlos explained that the papers presented at the meeting have already been uploaded in important reference systems and the volume will be widely distributed through WIT Press in digital and hard cover formats. All these papers are archived in the Wessex Institute eLibrary <http://www.witpress.com/elibrary>, where they are easily available to the international scientific community.

Carlos hoped that all participants will consider contributing to WIT Journals and other publications, as well as attending the series arranged by the Institute on Energy and the Environment.

A special dinner was organised at the end of the conference to celebrate its success and launch the new Journal. The members of the International Scientific Advisory Committee, as well as other colleagues who collaborated in the meeting were invited to discuss ways in which the Energy Quest meeting could be improved when it is reconvened in 2016.

Several toasts were proposed, including one by Carlos to all around the table for their help with Energy Quest 2014. He also described the idea of launching a Journal with the same aims as the conference to publish high quality papers dealing with energy production and management in an integrated manner.

The day after the conference closed, delegates were invited to a tour comprising a visit to the newly opened War Vehicles Museum outside Ekaterinburg. There they could appreciate the large industrial potential of the region to the military establishment, particularly during WWII where major industries were transferred to the Ural Mountains. Another interesting visit was to the place where the bodies of the Tsar and his family were buried, in an old mine shaft, outside Ekaterinburg. A new Monastery has now been built on the site which contains several churches and chapels and is a popular tourist site.

CONFERENCE PROCEEDINGS

The proceedings of Energy Quest 2014 – Energy Production and Management in the 21st Century, 1339pp (Print ISBN: 978-1-84564-816-9; eISBN: 978-1-84564-817-6) are available from WIT Press. Orders can be placed on the WIT Press web site at www.witpress.com or by email: marketing@witpress.com, telephone: +44 (0) 238 029 3223 or fax: +44 (0) 238 029 2853.

Papers from the conference will also be hosted online at the WIT eLibrary as Volume 190 of WIT Transactions on the Ecology and the Environment (ISSN: 1746-448X, Digital ISSN 1743-3541). For more details visit the WIT eLibrary at <http://www.witpress.com/elibrary>

